

Frameworks for Addressing Uncertainty and Risk in Climate Policy

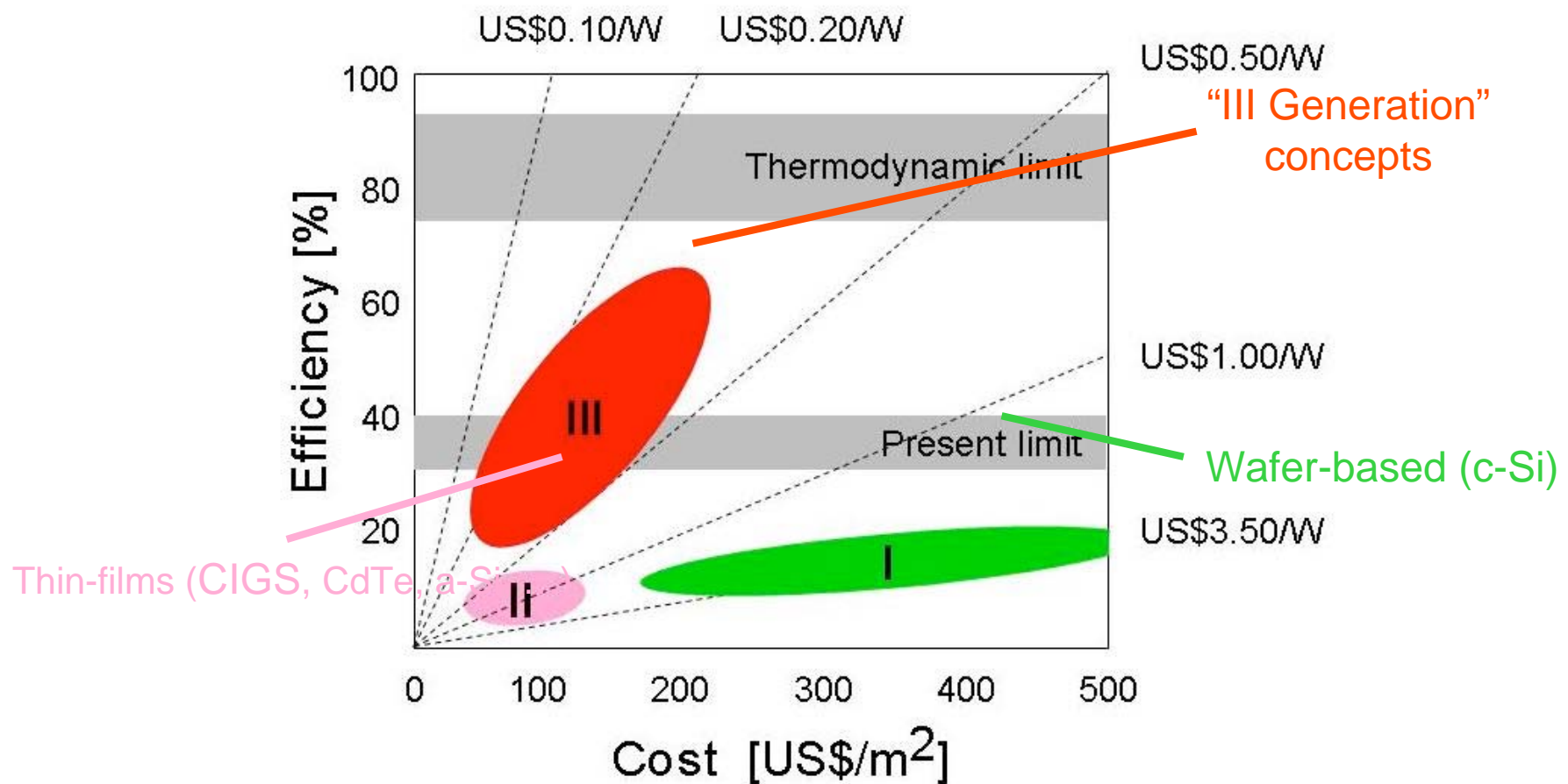
Presentation At:
Fourth Annual California
Climate Change Conference

Presentation By:
John P. Weyant
Stanford University
Professor, Management Science and Engineering

Outline

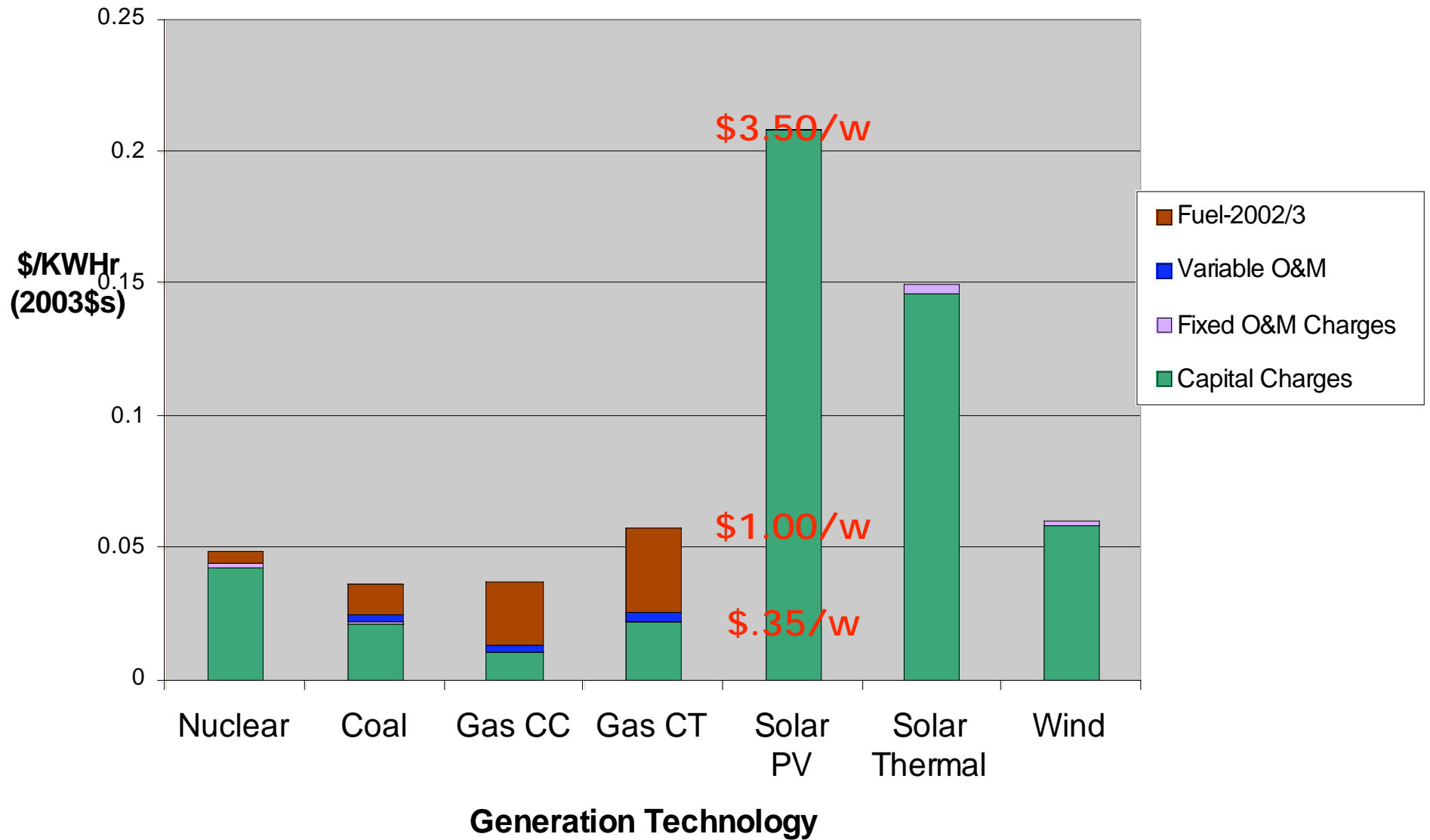
- **Why Dealing With Uncertainty is Important**
- **Approaches for Dealing With Uncertainty**
 - **Quantitative**
 - **Qualitative**
- **The Importance of Focus in Formulation**
- **The Importance of Flexibility in Analytics**
- **Risk Assessment and Risk Management**
 - **They are Related**
 - **They Are Not the Same Thing**
 - **This Requires Integration**
- **The Importance of Flexibility in Policies**
- **Communicating Results to Decision Makers**
- **Recommendations**

Reducing Cost and Increasing Efficiency of Photovoltaic Systems

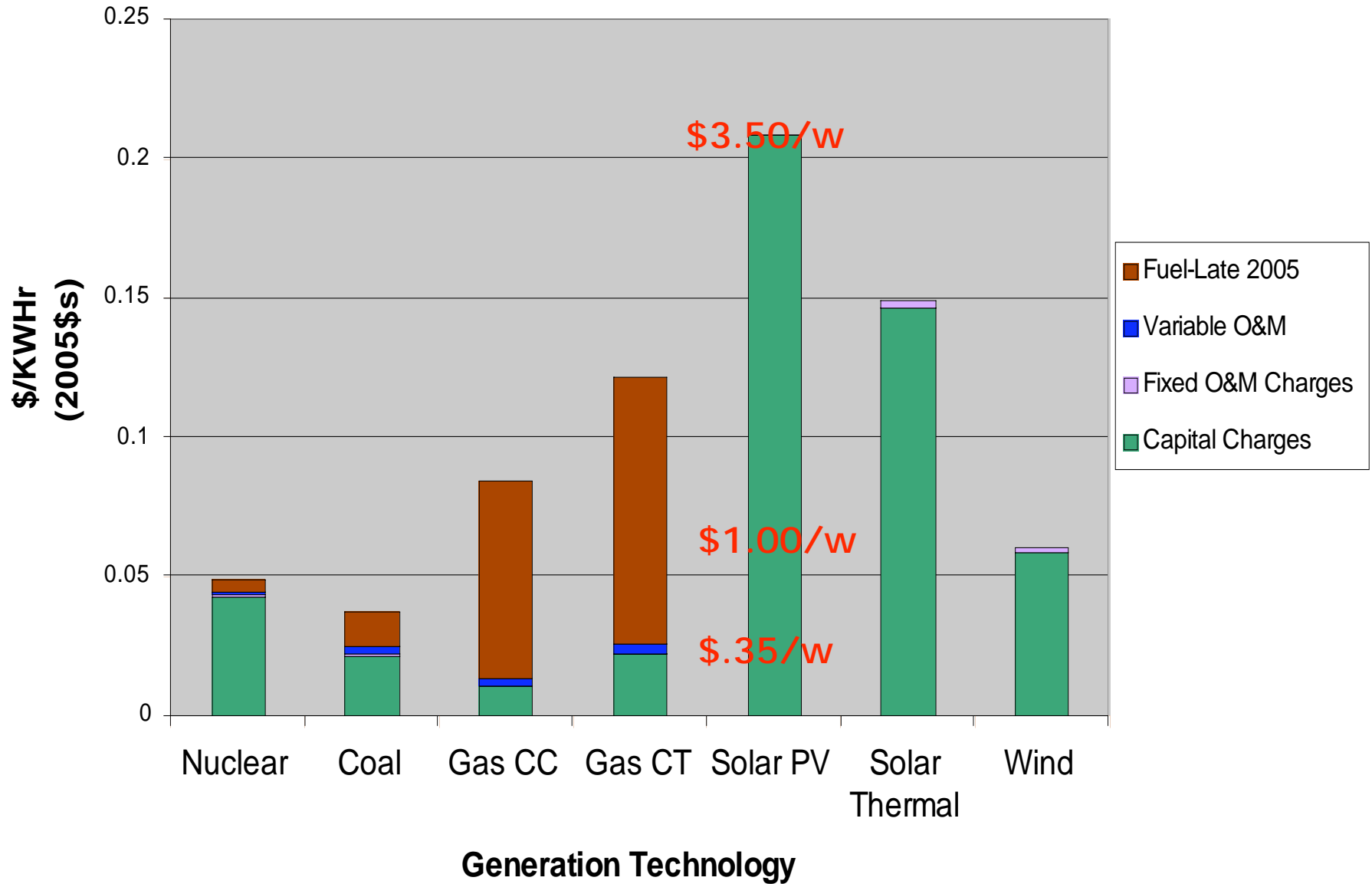


Source: (M. Green, UNSW & GCEP, Stanford)

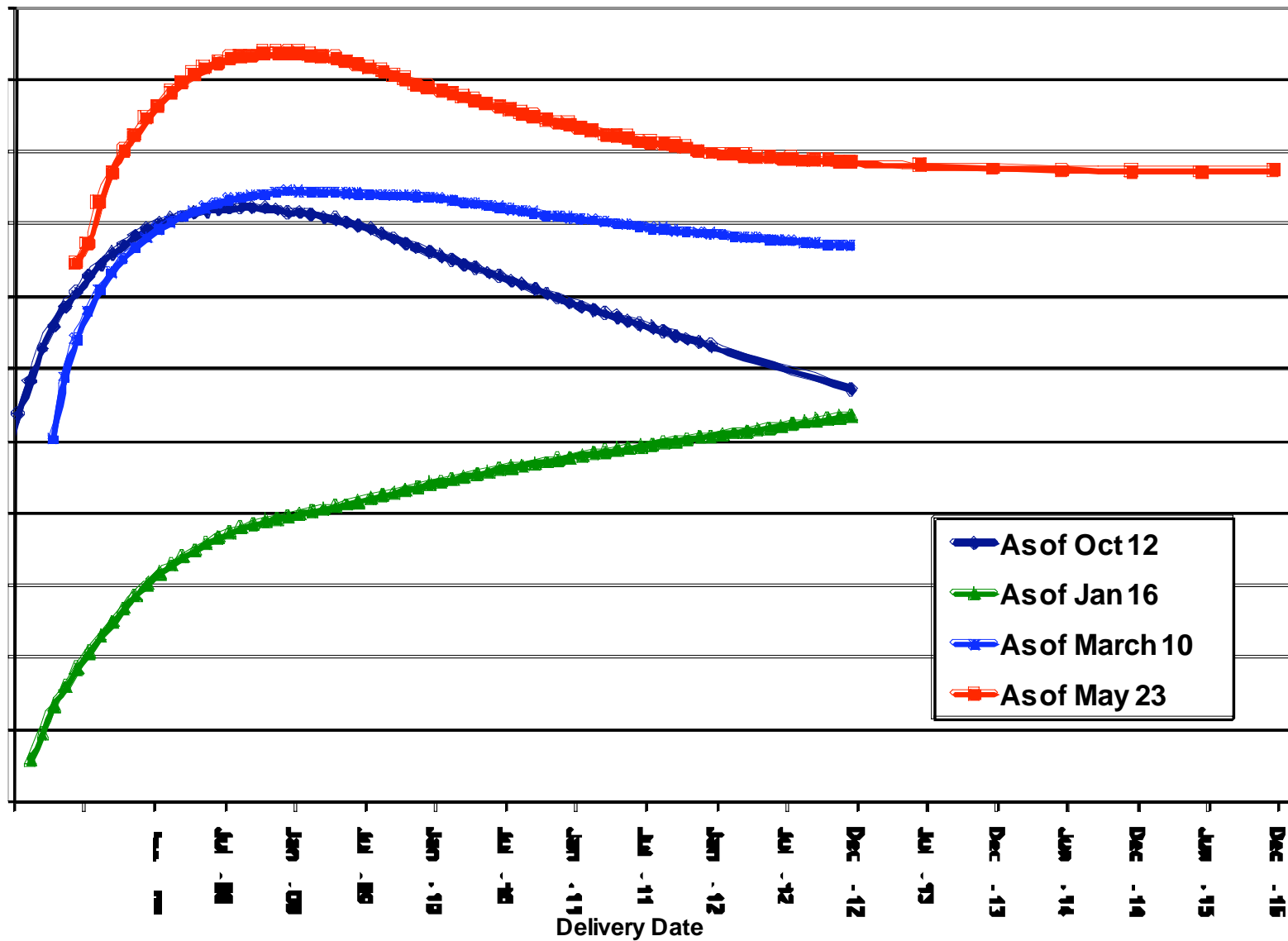
Electric Generation Cost Comparison (2002-03 Fuel Prices)



Electric Generation Cost Comparison (Late 2005 Fuel Prices)

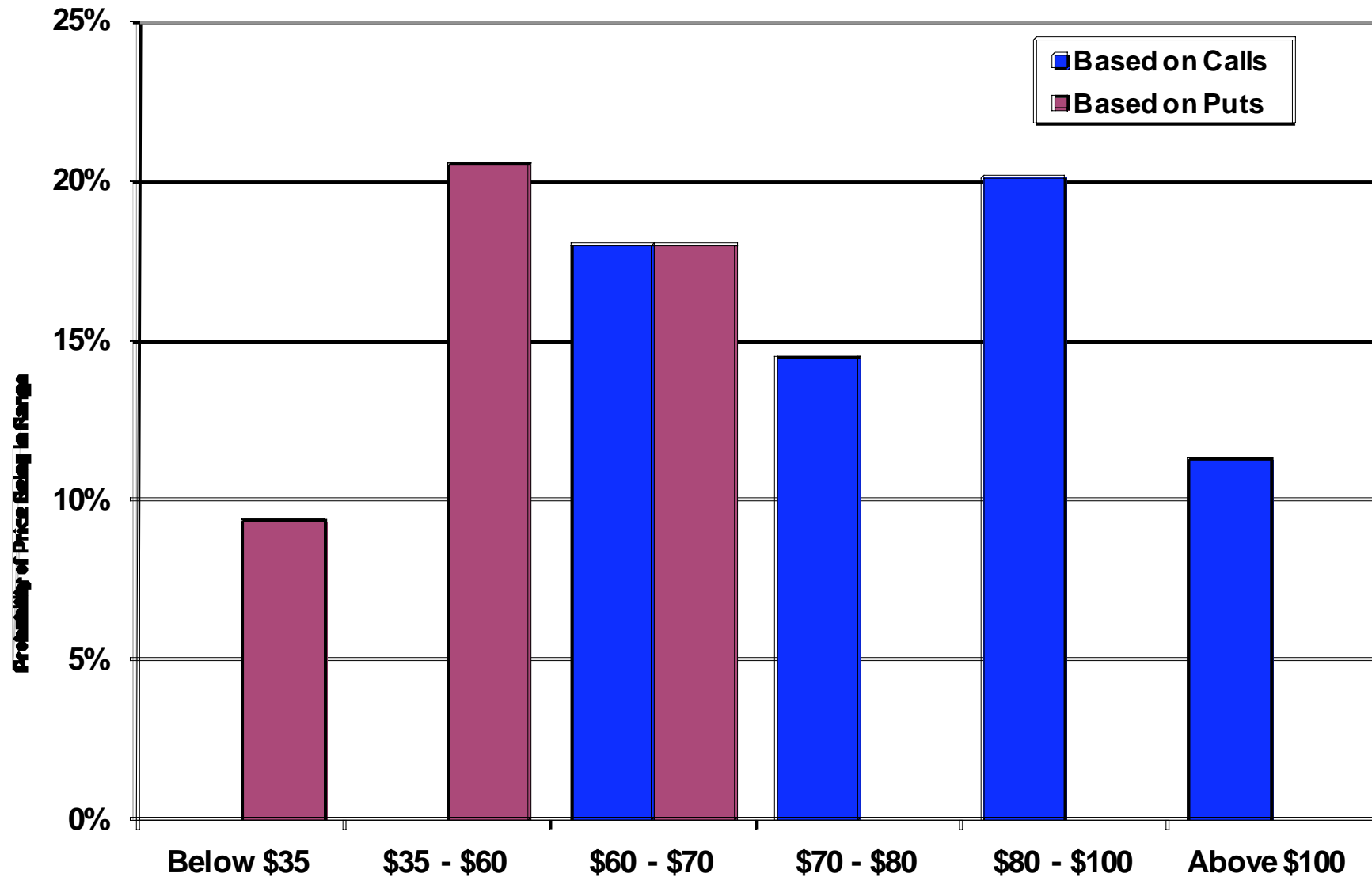


Crude Oil Futures Prices: As of Four Dates



Source: J. Sweeney, Precourt Institute, Stanford)_

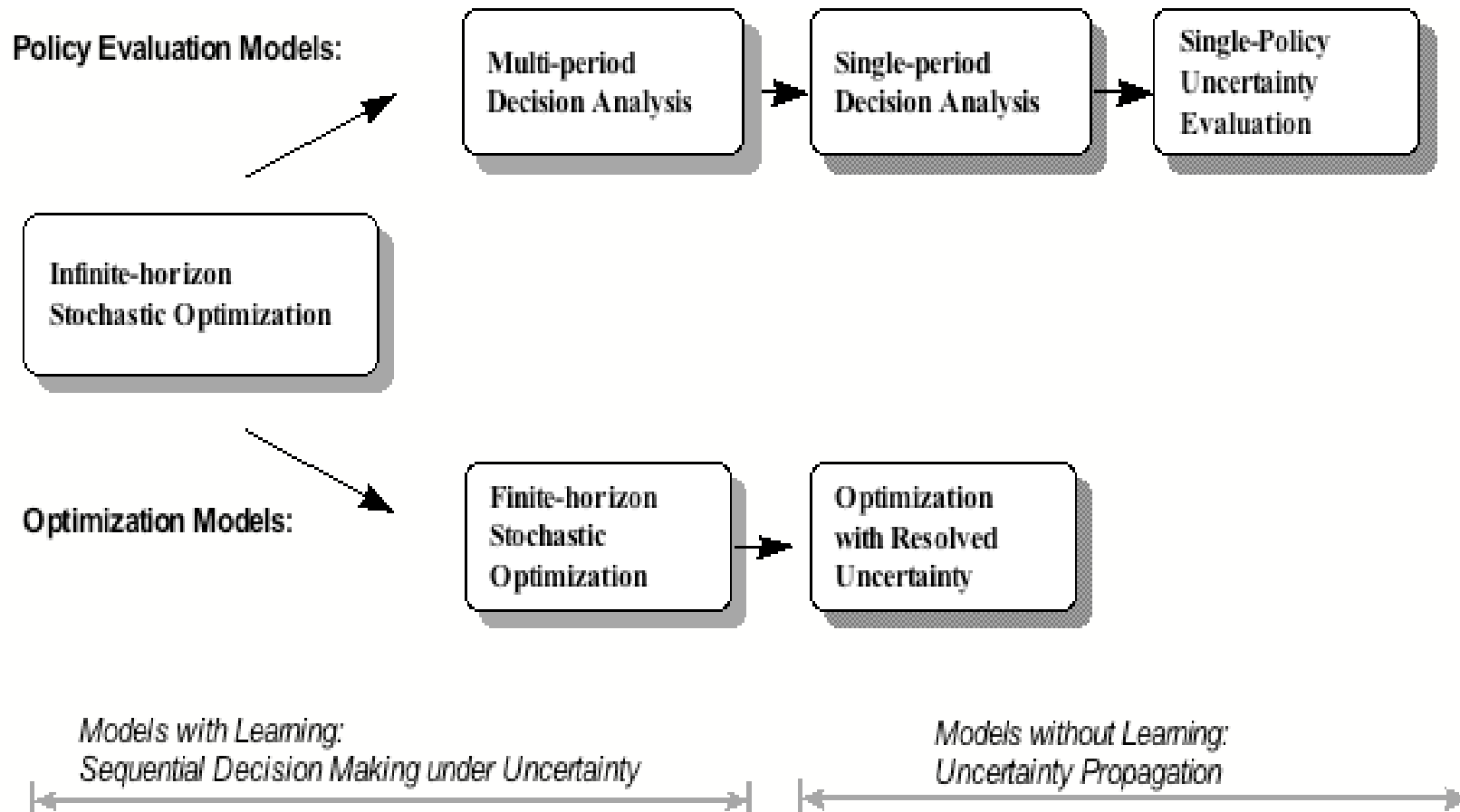
Oil Price Uncertainty December 2009 Delivery (data May 23, 2007)



Approaches to Uncertainty Analysis

- Quantitative
 - Sensitivity Analysis
 - Scenario Analysis (Strategic Scenarios)
 - Stochastic Simulation
 - Decision Analysis
 - “Robust Planning”
- Qualitative
 - Story Lines
 - Strategic Planning Approaches
 - The Market Structure Approach
 - The Resource Based View
 - The Simple Rules Approach

Survey of Quantitative Approaches



Kann, Antje, and J.P. Weyant,

“A Comparison of Approaches for Performing Uncertainty Analysis in Integrated Assessment Models,”
Journal of Environmental Management and Assessment, Vol. 5, No.1, 1999, pp 29-46.

Two Paradigms for Problem-Solving Under Uncertainty

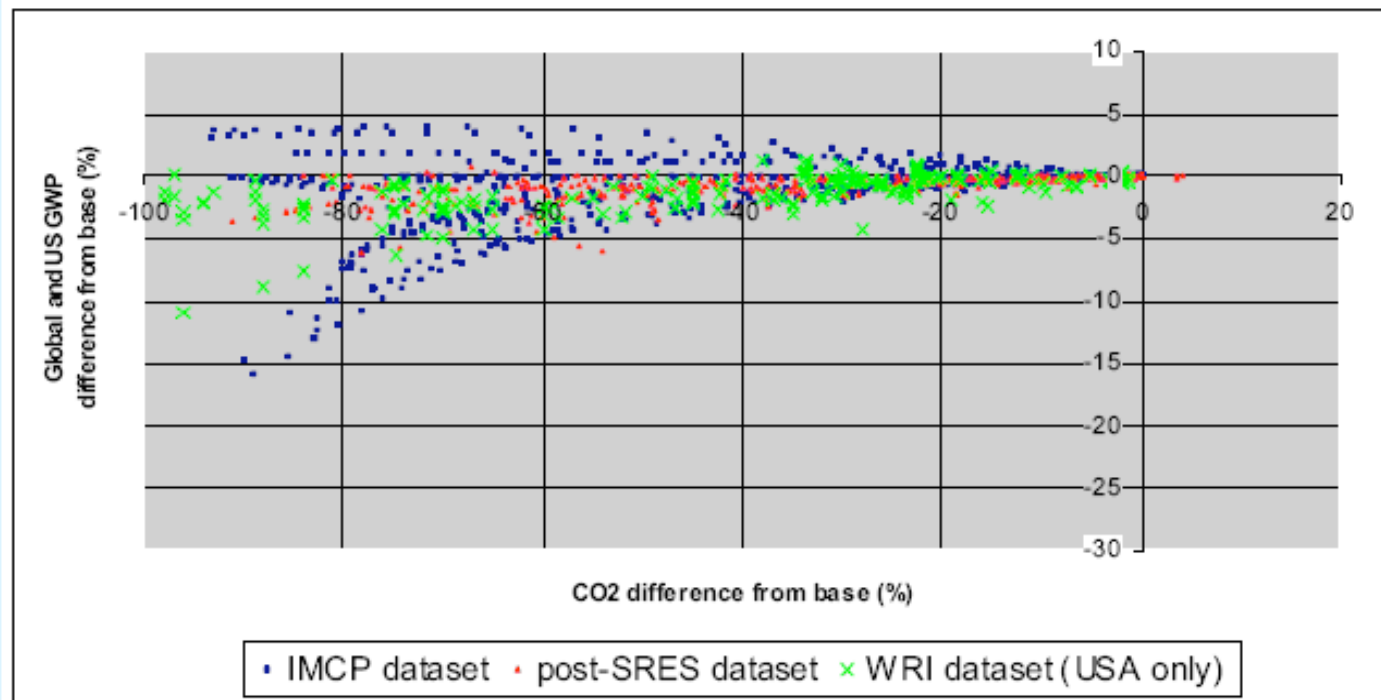
	Conventional	Complex Adaptive
Defining ontology	Mechanistic	Complex
Social organization	Centralized/hierarchical	Decentralized/distributed
Competence/Knowledge	High, technocratic, explicit	Mixed, experiential, tacit
Scale of testing	Small number of large tests with high consequence of failure	Abundant small scale, safe-fail experimentation
Sources of legitimacy/power	Policy communities, management elites	Civil society, democratic action, markets
Social location	Top	Bottom and middle
Goal	Optimization of expected utility (according to explicit, well-defined preferences)	Satisficing of multiple, often conflicting, and sometimes incommensurable values

Thomas Homer-Dixon, 2007

Example #1: The Stern Review (2006)

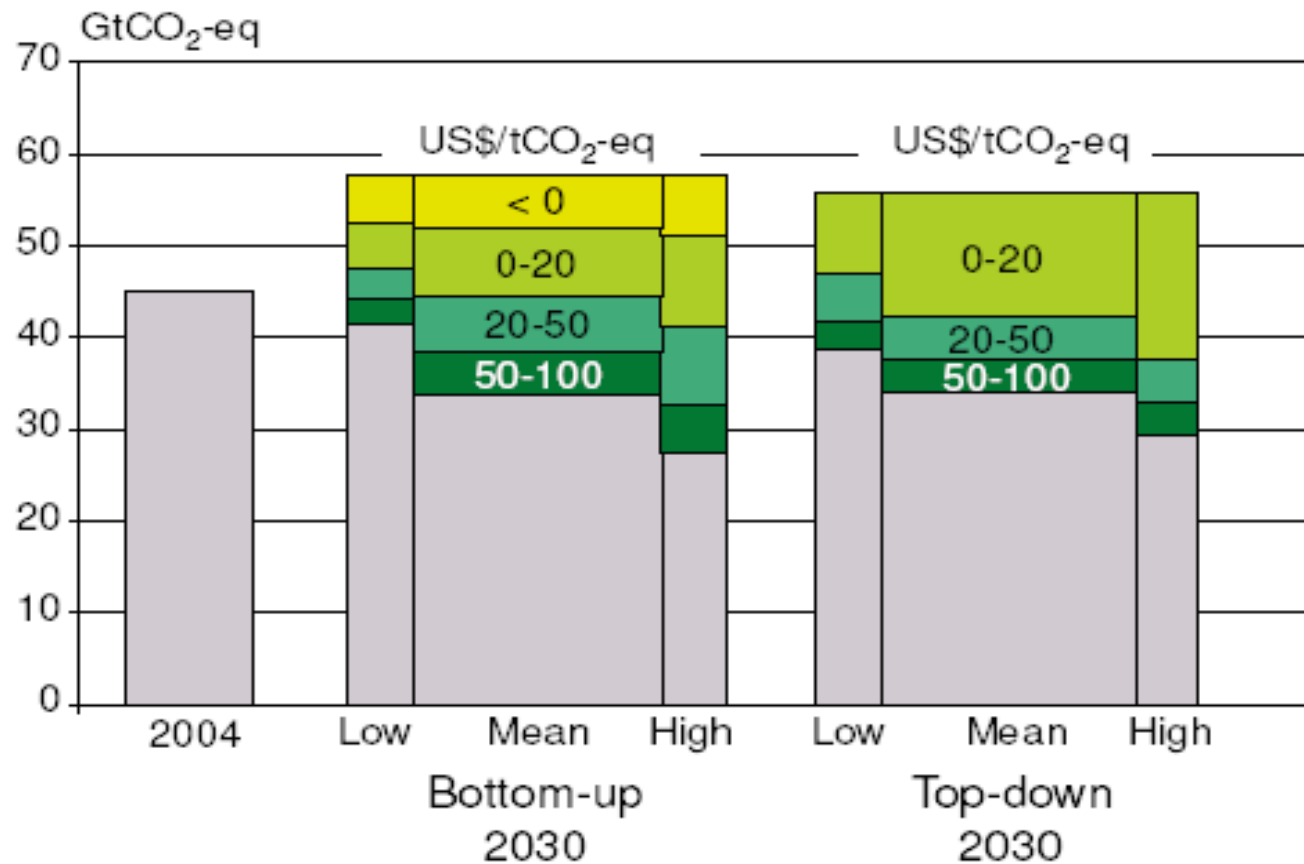
Figure 10.1 Scatter plot of model cost projections

Costs of CO₂ reductions as a fraction of world GDP against level of reduction



Source: Barker et al. (2006)

Example 2: The IPCC (2007)



Recommendations

- **Deal With Uncertainty**
- **The Importance of Focus in Formulation**
- **The Importance of Flexibility in Analytics**
- **Relationship Between RA and RM**
- **The Importance of Flexibility in Policies**
- **What's Analyzed Versus What's Communicated**